Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

LIBRARY
FEB 3 - 1936

Resettlement Administration
Washington.

LAND POLICY CIRCULAR

SUPPLEMENT

December 1935

PROGRESS IN RURAL LAND CLASSIFICATION IN THE UNITED STATES

By
Charles Gooze

****
*****
*

The LAND POLICY CIRCULAR is issued by the Division of Land Utilization, Resettlement Administration, in cooperation with the Division of Land Economics of the Bureau of Agricultural Economics. Its purpose is to provide technical information in the field of land economics to assist the staff of the Resettlement Administration and its cooperating agencies and groups to keep in touch with current developments bearing upon their work. Its pages will serve as a clearing house for information concerning local, State, and Federal land planning activities and research.

- 00 -

TABLE OF CONTENTS

Classification of Land According to Use-Capabilities........................ 1
Soil Surveys.................................. 2
    Soil Productivity Ratings
    United States Soil Survey
    State Productivity Ratings
Use-Capability Classification by the United States Geological Survey........... 6
Use-Capability Classification in Resettlement Administration - Region I.......... 7
    New York
    Pennsylvania
Resettlement Administration Region II........ 11
    Michigan - Alger County
    Minnesota
    Wisconsin
Resettlement Administration Region IV........ 15
    West Virginia - Nicholas and Webster Counties
Resettlement Administration Regions IV, V, and VI............................ 16
    Tennessee Valley
Resettlement Administration Region V......... 17
    Georgia
Resettlement Administration Region VII....... 19
    North Dakota - western counties
Resettlement Administration Region IX........ 20
    California
Resettlement Administration Region X......... 22
    Montana
Resettlement Administration Region XI........ 24
    Washington

PROGRESS IN RURAL LAND CLASSIFICATION IN THE UNITED STATES

By
Charles Gooze
Land Use Planning Section
Division of Land Utilization
Resettlement Administration

From the ferment of ideas on means of effecting agricultural adjustment, many minds working independently have drawn off concepts of land classification. The enthusiasm commonly displayed concerning the effectuation of such concepts in some measure has gratified workers in the field of land utilization, and recent gains recorded in many phases of land classification represent an advance of prime magnitude. Yet gratification in some cases has given way to apprehension -- whereas a few years ago mere introduction of the idea of land classification required mighty efforts, a major need today is the coordination of a large number of planning programs which embrace classification of land.

By what means is this coordination to be achieved? Because of the recency of its use as an instrument of land policy, land classification has few precedents permitting definitive selection of a given procedure for a given situation. The variety of land classification activities recently undertaken in this country offers some guidance; an analysis of such activities forms the substance of this survey.

Classification of Land According to Use-Capabilities

If a specific exists for land ailments, it is not classification. The pathology of land use covers more territory than conformance or non-conformance to land character. Nevertheless, the diagnosis of functional abnormalities in our land economy appears in good part dependent on more knowledge of the land, upon more knowledge employed in the manner peculiar to land classification.

In a broad sense, land classification signifies the classification and interpretation of land facts. Hence we may speak of the classification of soils, of slopes, of erosion conditions, of types of farm, of any one of the factors constituting a physical or economic inventory. Such schematized presentations of land facts serve in that they enlarge the field of land knowledge, but so long as they remain disparate items, with emphasis falling on the soil, or slope, or erosion, they fail to yield the full benefits of which they are capable.

Land classification in its land-use planning stages brings together these factors for the purpose of working out areas distinguished by comparative uniformity of use-capabilities. Study of the physical and economic factors leads to recommended uses for these areas. Uniformity of recommendation permits the designation of the areas as use-districts. The recommendation may assume many forms. For one part of the country, it may feature the outlining of agricultural and non-agricultural zones; or again it may involve a distinction between grazing and dry-farming districts.

Land classification activities selected for discussion in this paper are confined to those projects represented by the demarcation of areas on the basis of differences in use-capabilities. While alike in this regard, the programs show great differences in the procedure leading up to the final product. These differences will be indicated in the sections describing the several programs.

The survey will not include certain programs directed toward ultimate use-capability classification. Classifications of the individual items of land inventory -- other than soils -- which involve study of the distribution of single factors rather than the establishment of correlations among major physical and economic factors are excluded. The classification of soils will receive special emphasis because of the direct applicability of soil maps in the determination of use-districts.

With the exception of the sections on soil surveys and the United States Geological Survey Classification in the Western States, the treatment of programs has been standardized for the purpose of facilitating comparison. For each program is given a brief statement with regard to the land problems leading to land classification, this section in consequence presenting the objectives of the undertaking. A discussion of technique in arriving at the map of use-capability districts follows, and references to principal publications supplement the text.

Soil Surveys

In the field of use-capability classification, soil maps and accompanying reports afford the largest and most significant store of data. At the end of June 1935 the United States Soil

Survey, in cooperation with the agricultural experiment stations, had mapped 1,565,805 square miles. Surveys completed prior to 1908 are regarded as of secondary value, for systematic and accurate knowledge of soil characteristics in the United States was lacking before that date. The greater part of the surveyed area appears on maps having a scale of 1:65,500 (approximately one inch to one mile), each map in the majority of cases representing one county. Upwards of 600,000 square miles have had reconnaissance surveys made, the maps having relatively small scales, ordinarily covering several counties. In addition to reports by the Soil Survey, there are available maps and text for 56 counties in Illinois. Mapping in this State has been carried on by the Illinois Agricultural Experiment Station. The maps have a scale of 1:125,000 (about one inch to two miles), and until recently employed an independent scheme of nomenclature.

The land inventory preliminary to use-capability classification commonly includes the mapping of a number of physical factors. Budgets and reason dictate a limited choice. Whatever the selection, the distribution of soils is the prime requisite. The map of soils conveys more readily interpreted information than any other. It reflects to greatest advantage the summation of the physical factors operative at a given point. A detailed and accurate soil map, apart from its content of soil facts, expresses the salient features of physical geography -- surface configuration, climate, drainage, vegetation.

Owing to the close relationship between soil and land use, the soil map is the cornerstone of use-capability appraisal. Of itself, however, the map fails to provide enough information for the outlining of use-districts. True that the soils indicate physical possibilities, but the field of land classification has a broader goal. Soils of high natural productivity in a region remote from markets or in one made up chiefly of poor soils may be placed in a use-district which prevents realization of as intensive a use for such soils as would be possible under more favorable conditions of location.

The function of soil maps in land classification is further conditioned by the way in which soil distinctions are expressed. Because the map condenses so large a body of land knowledge into the conventional series, types, and phases, its intelligibility varies greatly with the experience of the individual. To the technician, the nomenclature of soil science permits ready appraisal and comparison of soil capabilities. To the non-professional, the number of identifying designations may prove confusing.

Textual descriptions of soil types and their utilization are of service, but the tiller of the soil wishes to enjoy as convenient and detailed a cataloguing of soils in regard to use as exists in regard to physical characteristics. An answer has recently appeared in the form of soil productivity ratings.

Soil Productivity Ratings

Soil Survey

Procedure in the assignment of ratings of productivity to soils is highly controversial. Local needs differ from regional needs, regional from national. The Soil Survey has adopted a scheme of ratings which permits broad comparisons. The fundamental concept relates to the ability of the land to produce under an assumed "standard practice". The latter signifies a system of management capable of maintaining the natural level of productivity as nearly as possible without irrigation, or the addition of lime and fertilizer. Influences like market distance and prices are disregarded.

The soil type first receives ratings relating the productivity of that particular soil to the "ideal" land in the United States for crops important in the area where the type is found. This kind of rating is called the "crop productivity index". Ten distinctions, ranging downward from the most productive land in the United States for a given crop, have been used. Evaluation of indexes for the several crops results in a "productivity rating" or rating of general agricultural productivity. The "productivity rating" ranks the soils on a scale of 1 to 10 with reference to land having the highest general agricultural productivity (1 on the scale) in the agricultural region in which the soil is located.

Where appropriate, the Soil Survey employs dual ratings for the two basic indexes. A secondary rating for general agricultural productivity may be used to indicate grade for the soil when drained or protected from flood. For the "crop productivity index", supplementary figures may be used to indicate productivity of the land when it is treated more intensively than under the "standard practice", or when drained and protected from flood.

Ratings assigned to soils in Crawford County, Wisconsin, are illustrative of the Soil Survey scheme.[1] Consider the Wabash fine sandy loam. When drained and protected from overflow, this soil type has a crop productivity index of 5 for oats, and 8 for tobacco. If the soil is undrained and unprotected from overflow, the drop in productivity is brought out by indexes of 2 for oats, and 2 for tobacco. The general productivity rating for the soil when drained and protected stands at 3; if the land lacks the improvements indicated, the soil falls to 6 on the scale comparing it with land having the highest general agricultural productivity in the agricultural region where the soil is found. In the case of the Bertrand fine sandy loam in this county, a rating for soil amendments has been made. This soil without lime ranks low for alfalfa; with the needed amendment, the rating rises from 2 to 7.

---

[1] "Soil Survey of Crawford County, Wisconsin". Bureau of Chemistry and Soils, Soil Survey, Series 1930, No. 34.

State Productivity Ratings

In response to State needs, several of the agricultural experiment stations have prepared productivity ratings lacking the wide applicability of the Soil Survey method. The Maryland[2] and North Carolina[3] ratings follow the scheme of symbols adopted by the Soil Survey. In cases of both States, however, the standards of comparison encompass only state-wide conditions. In each the ratings have been developed for all soil types within the States. Ratings advanced in Michigan[4] and New York[5] take the form of statements on "agricultural value and use" rather than quantitative presentation of soil differences.

The several State rating systems so far presented, as well as the Soil Survey ratings, derive their criteria in large part from the facts of actual land use, primarily those relating to yields. A system of ratings for California soils throws the emphasis on a quantitative expression of physical characteristics.[6]

---

[2] Bruce, O.C., and Metzger, J.E. "The Soils of Maryland: Productivity Classification." Maryland Agr. Expt. Station Bulletin 351, 28 pp., 1933.

[3] "Agricultural Classification and Evaluation of North Carolina Soils". North Carolina Agr. Expt. Station Bulletin 293, 157 pp., illus. 1934.

[4] Veatch, J.O. "Agricultural Land Classification and Land Types of Michigan". Michigan Agr. Expt. Station Special Bulletin 231, 51 pp. illus. 1933.

[5] Howe, F.B. "Classification and Agricultural Value of New York Soils." Cornell University Agr. Expt. Station Bulletin 619, 83 pp. illus. 1935.

[6] Storie, R.E. "An Index for Rating the Agricultural Value of Soils." California Agr. Expt. Station Bulletin 556, 1933. Six grades of soil based upon the Storie index have been used in the preparation of a series of "Soil Classification" maps for California. These sheets, on a scale of 1:250,000 (about 1" to 4 miles), cover all of the soil survey area for the State. They have been prepared by W.W.Weir, R.E.Storie, and D.Weeks, published by the experiment station.

Three factors of equal weight compose the index -- soil profile character, surface soil texture, and "soil-modifying conditions". Each factor is evaluated on a scale of 1 to 100 percent of the optimum. The product of the three factors represents the productivity of the soil type on a scale of 1 to 100.

Arriving at an index for, say, Holland stony loam, involves these ratings:

Soil profile character.....	60 percent
Soil surface texture.......	70 percent
Soil-modifying conditions..	80 percent

The three percentages multiplied yield 33.6 percent as the rating for the soil type. Appraisal of the natural productivity of a tract of land containing several soil types is made by weighting each soil type index to correspond with its acreage.

Use-Capability Classification by the United States Geological Survey

Abuses arising from early methods of distributing the public domain led to an insistent demand that the public lands be classified with regard to use-capabilities. Such classification has long been a function of the United States Geological Survey. Most extensive in area covered is the project conducted by the Survey's Conservation Branch. This undertaking now displays a number of maps. The classification of the Northern Great Plains includes eight sheets on a scale of 1:500,000 (about one inch to eight miles). They cover nearly all of Montana, the western lands of the Dakotas, and northeastern Wyoming. For the central Great Plains seven sheets show the land use-capabilities of southeastern Wyoming, southwestern Nebraska, western Kansas, and eastern Colorado. For Colorado and Wyoming two maps for each State take care of the western portions. Utah is classified as a whole on a map with smaller scale. A sheet for northeastern Nevada, on a scale of 1:500,000 will appear in the near future.

Classification of the lands covered by this project has resulted in the designation of a number of "land types". A typical map, sheet No. 7 of the Northern Great Plains, shows farming land, farming grazing land, grazing forage land, grazing land, irrigated land, irrigable land, and non-tillable grazing land. Field work was reconnaissance in type, and was limited to physical inventory. Determination of the land types depended also upon the consideration of all available statistical data on land use.

The Geological Survey Classification is one of physical use-capabilities. The outlining of a land type is founded on the "potential agricultural utility" of the area, irrespective of factors of immediate economic feasibility, such as lack of transportation facilities. Only by inference does the classification make recommendations relative to desirable use. To illustrate, the definition of farming-grazing land reads, "... areas which have a smooth to gently rolling surface and in which the climatic condition, soil texture, and fertility are favorable to successful production of grain crops probably 75 percent of the time, but yields are normally somewhat less than those of 'farming land'. In general areas embraced within this classification have a soil texture ranging from sandy loam to clay loam and a minimum precipitation ranging from 12.5 to 17 inches; 60 percent or more of the total precipitation occurs during the 6-month period from April to September. The growing season is 100 days or longer."

Geological Survey Land Types

Northern Great Plains - Sheet No. 7

Farming Land
Farming Grazing Land
Grazing Forage Land
Grazing Land
Irrigated Land
Irrigible Land
Non-tillable Grazing Land

Use-Capability Classification in Resettlement Administration

Region I

New York

Farm abandonment and its corollary, problems of undesirable settlement and fiscal difficulty, accounted in large measure for the inception of use-capability classification in New York. The strength of the impetus is to be understood from the fact that between 1880 and 1920 the area in farms in the State had declined by more than 3,000,000 acres. Large areas had fallen into a state of decadence. The accompanying fiscal difficulties and the perennial crop of settlers who soon found cheap land extremely dear had long disturbed the State. In 1923 the Extension Service of the New York State College of Agriculture undertook a localized survey of abandoned farms. The significance of the results was quickly attested by far more comprehensive investigations. The broader surveys played a major role in the formulation of policies stressing reforestation as the best means for placing the abandoned areas in a productive use, for taking off the market the poor land which lured settlers with little capital. Realization of objectives came in 1931 when the State adopted a program which provides for the acquisition and reforestation of a million or more acres. A sum of not more than $20,000,000 covering a 15-year period, is to be expended.

As an adjunct to its preparations for the reforestation plan, the State in 1930 had started a land survey to cover a period of about ten years. A "Land utilization and land classification" survey is a noteworthy part of the program. Maps showing areal use-capabilities are the end product of the mapping. This phase of the work began with a study of Tompkins County in 1930 by the Department of Farm Management and Agricultural Economics of the New York State College of Agriculture.[7] Comparable studies have been completed or are in progress for eight other counties.[8] In addition, preliminary surveys based in part upon knowledge gained in the more detailed types have been made for all or parts of several other counties.

The land classification technique employed in New York reflects the emphasis placed on State conditions. It rests upon three bases: (1) condition of farm buildings; (2) use of land; (3) character of soil. Inventory begins with a field investigation of the condition of farm buildings. This involves the assumption that in a region settled for a long period, that condition is an indication of the productivity of the land and the returns from farming. The validity of the classification was carefully checked by the use of exhaustive farm-business data.

Topographic maps furnish the base maps for field work. Their selection was due to several conditions: the State is completely mapped in this manner; the maps show building locations, the old surveys thus affording a clue to abandonment; the picture of surface configuration is a valuable aid in classification. For land-use mapping the maps are ruled in squares representing 10 acres, and the chief use for each square is marked in the field. This procedure facilitates correlations of land use data at no great loss of reliability. The final step in inventory mapping is the transfer of the land use data to soil maps.

---

[7] Lewis, A.B. "An Economic Study of Land Utilization in Tompkins County, New York." Cornell University Bulletin 590, 1934.

[8] Hill, F.F., and Blanch, C.T. "An Economic Study of Land Utilization in Montgomery County, 1932". Cornell University Bulletin 613, 1934.

The use-capability classification based on this work consists of six classes of land. In locating the boundaries of use-districts, the first step is a tentative grouping, on the map, of classes of farm buildings. The boundaries then are transferred to the maps of soils and land use. In the light of the additional map information, the areas are redefined. On the whole, the lines drawn on the basis of buildings, soils, or uses were in accord. Although the mapping denotes intensity of present use, the relative age of the agricultural occupance facilitates determination of desirable use on the evidence of current use. For example, land class I in Tompkins County contains many abandoned farms, and a large area in woodland. Forestry and recreation are indicated as use-capabilities for the areas included in this class.[9]

New York Land Classes

> Land Class I contains a large proportion of woodland and idle land, and a large proportion of abandoned farm land. It is primarily adapted to forestry and recreational uses.
>
> Land Class II is more intensively used than Land Class I. Considerable farming is done, but it contains much idle land and a large number of abandoned farms. The size and condition of the buildings and the crops grown indicate that, in general, the land is better adapted to forestry than to agriculture.
>
> Land in Classes III to VI is adapted to permanent agriculture. The higher the numeral the more intensively the land is used.

Pennsylvania

A situation akin to that in New York has fostered the classification of use-capabilities in Pennsylvania. The State School of Agriculture and Experiment Station, in cooperation with the United States Bureau of Agricultural Economics, has recently

---

9/ Lewis, A.B. "Methods Used in an Economic Study of Tompkins County, New York, and in other Similar Studies in New York." Cornell University Mem. 160, 56 p., illus., 1934.

10/
completed a state-wide survey featured by seven grades of land. For this project an objective was a quickly available view of classification for the whole State. Field work, therefore, was held to a minimum. The working data in the main came from published maps and census materials.

An index of crop productivity and an index of farm returns per acre of land in farms provided the means for marking out the use-districts. The index of crop productivity combines weighted yields for six major crops with the intensity of farm use (for the land in farms.) The index of farm returns per acre of farm land is a percentage of the farm income of an equal area of average Pennsylvania farm land. An arithmetic mean of the two indexes was considered a reasonably accurate gauge of the intensiveness of farm operations, and of the use-capabilities for an area. The location of forest lands was furnished by the Pennsylvania Department of Forests and Waters.

Pennsylvania Land Classes

Class I land is forested. Some of this is in farms, but most of it is not. It includes wooded or brush land in blocks of 50 acres or more.

Class II land - submarginal farm land - contains lands in which both indices are less than 50 and which show a decline in population of 25 percent or more between 1910 and 1930.

Class III land - below average farm land - where indices average from 50 to 69 percent.

Class IV land - average farm land - indices averaging 70 to 119.

Class V land - above average land - indices averaging 120 to 199.

Class VI land - superior farm land - indices averaging 200 or more.

Class VII land - urban, suburban, and industrial.

10/ Wrigley, P.I. "Land Use in Pennsylvania". Pennsylvania Agricultural Experiment Station Bulletin 317, 39 p. illus. 1935. See also "Land Utilization and Farm Management in Wyoming County", same author. Pennsylvania Bulletin 257. 1930.

Michigan - Alger County

Land problems in the cut-over lands of Michigan have led to the development of a large mass of materials of great value in use-capability appraisal. Exploitation of originally magnificent stands of timber had left in its wake a host of incipient maladjustments. Much of the forested area consists of soils of relatively little value for agriculture. Yet widespread efforts were made to create farms on such soils by members of communities left stranded by exhaustion of the forest resources, and by misguided settlers attracted by low land costs. The latter group was subjected to powerful land-selling drives organized by both public and private agencies. Problems of forest utilization further attested the need for widespread readjustment. Chaotic conditions ensued for individual and administrative unit alike. Here and there areas of better soils supported self-sustaining communities, but the situation in general meant impoverishment for the farmer 11/ or community and acute fiscal distress for the governmental body.

In order to guide settlers to the better lands of the cut-over region, to ascertain the use-capabilities of land types, and hence in order to achieve a functioning fiscal system for the area covered, land inventory was undertaken.12/ The Michigan Land Economic Survey began work in 1922, and has confined its work to fact-finding. Classification here meant inventory, physical and economic. Determination of use-capabilities (other than that included in soil surveys) and attendant statement of policy were to be left to other agencies. As a result, although the breadth of inventory has matched that capped by use-districting elsewhere, the Survey's work comprises only inventory materials. As of early 1935, the State had map surveys of various degrees of completeness for 24 counties. In 15 counties mapping had been completed for the county as a whole.

A use-district plan for Alger County demonstrates the potential utility of Land Economic Survey materials.13/ The report in explanation of the plan presents in order these maps for parts or all of the county, all data from the Survey: ownership (names); soils; cover; transportation and water features; distribution of population; natural districts; actual use generalized; intent in ownership; assessed valuation, and tax delinquency.

11/ Hartman, W.A., and Black, J.C. "Economic Aspects of Land Settlement in the Cut-over Region of the Great Lakes States". U.S.Department of Agriculture Circular 160, 1931.

12/ Barnes, C.P. "Land Resource Inventory in Michigan". ECONOMIC GEOGRAPHY Vol. V (1) 1929, p. 22-35.

13/ Schoenmann, L.R.A. "Land Inventory for Rural Planning in

In the preparation of the "utilization plan" -- the use-district map -- Schoenmann made "a thorough study and digest of the full detail of the inventory data and their environmental controls." By a process of correlating past, present, and future use, the author identified "certain combinations of character and environment as having proved either suitable or unsuitable for particular types of utilization." The next step was the determination of the use-capabilities of the county's nine natural districts with respect to eight possible types of land use. The natural districts were areas "possessing a marked unity and individuality of character." Their delimitation depended on study of original timber, surface form, drainage, and soil. With discordant combinations of use and land character ruled out, the plan provides for seven major use-district categories. There are four recommendations for forest, four for wildlife propagation, four for recreation, four for parks, six for agriculture, four for cities and towns, and one for water power.

Use-Districts Alger County, Michigan

Forests
- F1 - Experimental
- F2 - National
- F3 - State
- F4 - Private

Wildlife Propagation
- W1 - Sanctuary and Refuges
- W2 - Public Hunting Ground
- W3 - Fur Farms
- W4 - Game Farms

Recreation
- R1 - Commercial Resorts
- R2 - Hunting and Fishing Clubs
- R3 - Cottages and Camps
- R4 - Golf Courses

Parks
- P1 - State Parks
- P2 - County Parks
- P3 - Township Parks
- P4 - City Parks

Agriculture
- A1 - Experimental
- A2 - Grazing
- A3 - Dairy-Woodlot
- A4 - Dairy-Hay-Potato
- A5 - Dairy-Poultry-Fruit
- A6 - Garden Homes

Cities and Towns
- C1 - Industries
- C2 - Business and Residence
- C3 - Health Homes
- C4 - Airports

Water Power
- H - Flowage Rights and Plant Sites

Alger County". Papers of the Michigan Academy of Science, Arts, and Letters. XVI. 1931, p. 329-361.

Minnesota

Land use problems in the cut-over area of Minnesota repeat the features of those in Michigan. But steps taken to promote desirable adjustment show some departures. In January 1933 the Minnesota legislature authorized counties to classify their lands into agricultural and conservation zones. For such action there were available neither the zoning power nor in many counties the requisite land inventory data.

Despite the lack of information comparable with that gathered in Michigan or New York, the critical need for guidance in land use in northern Minnesota impelled State and Federal agencies to undertake a tentative classification of use-capabilities. A joint survey by the Division of Agricultural Economics of the University of Minnesota and the Division of Land Economics of the U.S. Bureau of Agricultural Economics was undertaken for fourteen northeastern counties.14/ For one of these counties, Hubbard, an earlier detailed survey provided many essential criteria with reference to the entire program. Classifications for thirteen other counties were made in a supplementary survey.

Use-capability classification took the form of two types of use-district. Land deemed suited to agricultural utilization was placed in an agricultural district. A conservation area set off those lands fit for less intensive use. Included in the conservation district were "(1) lands that because of their physical characteristics appear, in the light of present and prospective economic conditions, to be unable to yield a net return from agricultural use; or (2) lands so located that it would impose an undue burden upon the public to provide school, road, and other services if new settlement were permitted at the present time." Location of use-district boundaries began with an office project of relating ownership pattern to soils, cover, roads, and schools. Then a provisional subdivision of the county into districts was attempted. This proceeded township by township, the study serving to separate wherever possible the settled from the unsettled parts of the township. Submission of the district maps to county officials brought further refinement. Where discrepancies occurred, field inspection was made. Finally all boundaries were checked in the field by inspection or local interview.

14/ Jesness, O.B., and Nowell, R.I. "A Program for Land Use in Northern Minnesota." University of Minnesota Press, 1935.

Minnesota Use-Districts

> Conservation zones shall be areas which are to be devoted primarily to timber growing and other conservation purposes.
>
> Agricultural zones shall be areas devoted primarily to agricultural purposes.

Wisconsin

In Wisconsin, the land problems common to the cut-over areas of the three upper Lake States have brought about the development of a land classification program which is tied to legal zoning of land use. Definition of the boundaries of rural use-districts has had its fullest legislative expression in this State, Oneida County in 1933 adopting the first strictly rural zoning ordinance.15/ Wisconsin now has more than one-fourth of its counties zoned, and remains the only State in which genuinely rural zoning has been effected.

Zoning as a means of directing land use followed intensive studies of the State's problems. In 1928 land inventory was begun under the guidance of the University of Wisconsin, the State Department of Agriculture and Markets, the Wisconsin Conservation Commission, and cooperating federal agencies. In many respects the program closely resembled that of the Michigan Land Economic Survey.16/

As the Wisconsin program is directed toward zoning, the complete survey differs from that of Michigan in containing maps of use-districts. The official county zoning map is entitled, "Zoning Map Showing Use-Districts." Ordinarily showing forestry, recreation, and unrestricted use-districts, the use-capability maps prepared by the Land Economic Inventory Office are modified at town hearings held in order to give effect to local viewpoints.17/

15/ Hendrickson, C.I. "Rural Zoning". U.S. Department of Agriculture, Bureau of Agricultural Economics. 1935, mimeographed.

16/ Duffy, W.A., Whitson, A.R., and Wehrwein, G.S. "The Land Economic Inventory of Northern Wisconsin." Wisconsin Bulletin 97, 1929.

17/ "Langlade County." Extension Service, Wisconsin College of Agriculture, Special Circular, 1934. The report on Langlade County presents the most complete available statement on the procedure followed in Wisconsin in developing the zoning map for a specific county. Other circulars containing land economic inventory data are to be had for the following counties: Ashland, Bayfield, Douglas, Forest, Juneau, Marinette, Oneida, Sawyer, Taylor, Vilas, Washburn.

Use-Districts, Langlade County, Wisconsin

Forestry District
Recreation District
Unrestricted District

Region IV

West Virginia - Nicolas and Webster Counties

The interdependence of agricultural and forest industries has given a distinctive character to land-use problems in parts of the Northern Appalachian Plateau States. Agricultural activity in many areas has been contingent upon development of the forest industries. The latter furnished both a market for farm products and employment for farm population. With timber resources dwindling, decadence in agriculture has become a pressing problem. Moreover, the inability of private owners to carry the growing burden of cut-over land has further aggravated local fiscal difficulties.

Owing to the size of the area affected by these problems in the Appalachian Plateaus, investigations based on use-capability classification have been limited to type studies. Representativeness dictated the choice of Nicholas and Webster Counties for one such treatment, undertaken by the United States Bureau of Agricultural Economics, the United States Forest Service, and the Agricultural Experiment Station of West Virginia.[18]

Soil maps for the two counties furnished the foundation for determining use-capabilities. To the information supplied by the soil maps, field workers added data on surface configuration, drainage, and stoniness. Through the use of an arbitrary "satisfactory income" for farm units, the investigators studied the relationships between farm economy and physical features. The next step was the analysis of the use-capability distinctions so far evolved with reference to community pattern. Would the possible indicated adjustments support the usual community services? As final product, a use-district map shows land adapted to farming and land not adapted to farming.

Classes of Land - Nicholas and Webster Counties, West Virginia

Land adapted to farming
Land not adapted to farming

---

[18] Peck, M., Frank, B., and Eke, P.A. "Economic Utilization of Marginal Lands in Nicholas and Webster Counties, W.Va." U.S. Department of Agriculture Technical Bulletin 303, 1932.

Tennessee Valley

New objectives and new materials have promoted the creation of a distinctive type of use-capability classification in the work of the Tennessee Valley Authority.[19] One reason for the individuality of the TVA program is the need for speed in gathering land planning data for the entire region. In the second place, the unifying goal of power development has given special prominence to dam and reservoir sites. And with regard to mapping materials, the availability of aerial photographs for the entire valley has facilitated the introduction of a field technique based primarily upon aerial mosaics.

A "unit area" classification of use-capabilities will constitute the master map key to land planning. It is currently represented by close to 10,000 square miles mapped on a scale of 1:24,000 (about 2½ inches to the mile). Most of this work has been done in the Upper Tennessee Valley, northeastward from the confluence of the Holston and French Broad rivers.

The "unit area" method features the delineation of use-districts; five classes of land are differentiated on the premise of present land use as an indication of use-capability. Classes I, II, and III include lands suited to "general and specialized agriculture", with emphasis in the case of III on legumes and pasture. In Class IV are placed lands suited to pasture, but which seldom should be used for cultivated crops. Class V embraces lands unfit for pasture or crops and adapted in the main to forest. Boundaries of areas with uniform use-capabilities -- units as small as 200 acres -- are mapped on the aerial mosaics in the field. Field evaluation of a number of physical and economic factors supplies material for the subsequent use-recommendation for the "unit areas".

Serving the double purpose of perfecting technique and checking the more generalized unit area mapping in addition to furnishing minute map information, detailed strip surveys have been made for several hundred square miles. This phase of the mapping depends upon aerial maps on a scale of 1:12,000 (about five inches to the mile). Most extensive of the strips is that used as the base for "unit area" classification in the upper valley. This strip runs across the grain of the valley, and depicts the use-capabilities for most of the characteristic sections of the Tennessee Valley. A strip in the vicinity of the Pickwick Landing dam project was surveyed for the purpose of locating the "taking" or "severance" line for the reservoir. This line demarcates the area to be purchased by the government. Aside from the land to be flooded, the line encloses land recommended for purchase in order to protect the reservoir against accelerated erosion, and to compensate property-holders for serious physical and economic impairment of their lands. A companion objective, served by the use-capability classification, brought out by both strip survey and "unit area" maps for about 800 square miles, was the investigation of where displaced population, roads, utilities, schools and the like would be best relocated. In the valley of the Hiwassee River, a strip was run for a third purpose. Here the Authority wished to determine whether the development of a power project was advisable in the light of consequent changes in local economy.

---

[19] This discussion has been prepared on the basis of conference with G. Donald Hudson, Chief of Land Classification Section, Land Planning and Housing Division, Tennessee Valley Authority.

Tennessee Valley Major Land Classes

Class I - Units characterized by excellent standard of living and by land exceptionally well suited for both general and specialized agriculture.

Class II - Units characterized by good standard of living, and by land suited for general and specialized agriculture.

Class III - Units characterized by medium standard of living, and by land suited for general and/or specialized agriculture with emphasis on legumes and pasturage.

Class IV - Units characterized by moderately low standard of living, and by land suited for pasture, but which seldom should be used for cultivated crops.

Class V - Units characterized by a low standard of living, and by land that is unfit for pasturage or cultivated crops.

Region V

Georgia

Use-capability classification as carried out in Georgia has had as one aim the study of land problems affecting a large part of the Cotton Belt. Chief interest has centered on the lower Piedmont.

There the uniting of non-resident ownership, tenant operation, low cotton prices, and the boll weevil has contributed to the creation of a grave problem.

Owing to the lack of data and the urgency of alleviation of economic distress, land classification methods employed in Georgia exhibit several noteworthy features.[20] The work has been conducted by the Georgia Agricultural Experiment Station and the United States Bureau of Agricultural Economics. The physical inventory preliminary to use-capability classification involved a correlation of soil type, slope, kind and degree of erosion, and land use, all mapped in place. To obtain as comprehensive a picture of the 35 lower Piedmont counties as permitted by circumstances, the inventory took the form of strip surveys and intensive studies for four sample areas. The strip ran 208 miles, had a width of eight chains (528 feet), and traversed eleven counties. Soil surveys, aerial photographs, and planetable maps made in the field were used as bases. The evaluation of physical and economic inventories resulted in five use-capability classes, among which all upland soils were allocated.

Another technique in land classification as applied to four contiguous counties -- Jasper, Jones, Morgan, and Putnam -- was focused on the fiscal problems of the lower Piedmont. Motivations for the investigation were excessive need for State aid, heavy tax delinquency in three of the counties for which the general property tax furnishes 95 percent of county tax income, and inequitability of tax assessment. Cover mapping, on soil map and aerial photograph bases, was confined to such material as could be gained through inspection along all principal roads and through side excursions to principal points of vantage. In the demarcation of use-districts, more attention was given to present maladjustment than to recommended uses. The four land classes evolved testified to the connection between fiscal difficulty and the failure to appreciate use-capability differences.

Georgia Land Classes

Class I. Severely eroded and unproductive lands; 90 percent unsuited to cultivated crops; limited adaptability for pasture; most of area should be in trees.

Class II. Rough, mountainous, forest, and swamp land; 90 percent unsuited to cultivated crops; constructive forestry management needed.

20/ Hartman, W.A., and Wooten, H.H. "Georgia Land Use Problems". Georgia Agr. Experiment Station Bulletin 191, 1935.

Class III. Poorly drained areas in I, II, V, VI, VII.

Class IV. Urban and Miscellaneous Lands.

Class V. Fair to poor farm land; not in good operating position; 35 percent suited to cultivated crops.

Class VI. Fair farm land where erosion control work is needed.

Class VII. Good farm land areas.

Region VII

North Dakota - Western Counties

Determination uf use-capabilities in North Dakota has dealt primarily with tax assessment needs, and in particular, equalization of assessment. Authorization has long been provided, but the work is optional with the counties. Although the law makes some effort to guarantee uniformity, in practice this has been difficult to achieve, as the counties vary in available soil survey materials as well as in point of view.

Land classification initiated in McKenzie County marks an attempt to standardize technique for the State.[21] At the request of county authorities, the United States Soil Survey collaborated with the State Agricultural Experiment Station in carrying out a soil survey. On the basis of the soil map, the experiment station worked out a use-capability classification, which now takes in Billings County and part of Morton County.

In brief, the North Dakota method covers physical inventory pointed toward the map definition of natural land types, economic inventory summed up in "use-groups" -- such as grazing or crop production, and rating of each tract of land according to its capabilities within each "use group". The selection of mapped physical inventory data is related to the principal "use groups" of the county. The series of inventory items includes soils, lay-of-land, grass cover, stoniness, drainage, trees, and several lesser factors. Owing to the use to be made of the survey, great detail in inventory is required. Estimation of natural productivity for the land types follows, the best crop land standing for the ideal. Ratings are expressed in percentages of this standard. Ideal grazing land is held as equivalent to 30 percent of the ideal for crop land.

21/ Kellogg, C.E., and Ableiter, J.K. "A Method of Rural Land Classification". U.S.Dept.of Agriculture Technical Bulletin 469, 1935.

As the tax-roll unit is one-sixteenth of a section, economic inventory deals with 40-acre tracts. But effect is given to the organization of the individual farm or ranch in arriving at a final rating. The land in each 40-acre tract is placed and rated within its "use-group" or "use groups" (the latter if the tract contains both cropping and grazing areas). Ratings for cropping or grazing are further modified to reflect location - e.g., isolated areas of 10 to 20 acres which belong to a natural land type suited to cropping receive only 85 percent of their cropping rating if they lie in the cropping "use-group". To conclude the evaluation, adjustments are made for accessibility to market; and for grazing land, the distance to water. In appraisal for assessment, the county fixes the level of assessment for ideal cropping land. As farm improvements are not taxed in North Dakota, appraisal boils down to percentages of this level as given in the final ratings.

Use-Capability Groups - McKenzie County, North Dakota

Cropping Use-Group
Grazing Use-Group

Region IX

California

A unique complexity of natural land types has made California conscious of its land problems. Conflicting interests in the use of land resources have precipitated bitter and protracted controversies. The result has been a long list of problems. Forest areas have passed through the stages common to undirected exploitation. Grazing lands have duplicated much of the history of the range farther east.

Statement of use-capabilities in the form of use-districts has appeared in connection with two lines of work. One line comprises sample county classifications in the foothill zone to the east of the Central Valley. The other consists of the appraisal of use-capabilities for the lands of the Central Valley and nearby foothill areas.

In El Dorado County, typical of much of the Sierra foothill area, conflicts among uses have reached a critical state. Here in 1929 the California Agricultural Experiment Station and the United States Forest Service began a survey of land-use problems.[22] The findings are summarized in a map of use-districts; six classes of desirable land use are shown. Similar studies are under way for other counties.

---

[22] Weeks, D., Wieslander, A.E., and Hill, C.L. "The Utilization of El Dorado County Land." California Bulletin 572, 1934.

The method of evolving use-districts from the facts of inventory features first, the outlining of physical districts. For El Dorado County 32 such sub-divisions have been made on the basis of the soil survey. Data on "income and utilization" then are used in grouping the physically distinguished areas into major economic classes, the latter expressed in use-districts. The lands of El Dorado County have been placed in six use-districts, for which the dominant recommended uses are selected from the following "economic classifications":

> I. Fruit production with forest crop and industry; II. Potential farm and/or forest crop; IIIA. Medium large scale livestock production; IIIB. Diversified livestock farming and potential forest crop; IV. Forest crop with recreation and grazing; V. Recreation with forest crop and grazing.

Classification in the Central Valley and nearby foothills has taken the form of appraisal of adaptability of land for irrigation.[23] Determination of use-capabilities was checked in the field and was based on all available material relating to physical and economic conditions. Five classes of land were set up for the valley floor, the fifth for non-agricultural areas. Illustrative of the approach is the definition for Class I; "All lands ... where soil texture, alkali, or topography do not materially limit the feasibility of irrigation or crop yield." In the case of foothill lands, five classes also were developed. For these areas the class distinctions depended on the "percentage of land which might come under irrigation at some future time."

California Land Classes

El Dorado County

I. Fruit production with forest crop and industry.
II. Potential farm and/or forest crop.
IIIA. Medium and large scale livestock production.
IIIB. Diversified livestock farming and potential forest crop.
IV. Forest crop with recreation and grazing.
V. Recreation with forest crop and grazing.

Note: "The dominant use (given first in the legend) may be entirely dependent upon secondary uses to make it feasible."

---

[23] "Sacramento River Basin". California Division of Water Resources Bulletin 26, 1931. "San Joaquin River Basin". California Division of Water Resources Bulletin 29, 1931.

Central Valley

I. Lands where soil texture, alkali, or topography do not materially limit the feasibility of irrigation or crop yield.
II. Lands of a "deferred" type both as to use of irrigation waters and as to future settlement and development.
III. Lands extremely hummocky, with shallow soils, rough channel cut, or steeply rolling.
IV. Lands of extremely dubious agricultural worth because of alkali or deficient soil conditions.
V. Lands of no present or potential agricultural value."

Region X

Montana

Problems arising from maladjustment in areas of ranching, dry-farming, and irrigation farming have led to a land classification program for Montana. In dry-farming districts, destitution has stalked many farmers attracted by reports founded on years of exceptionally high rainfall; the use of lands submarginal for dry-farming, moreover, has destroyed the range and has induced soil erosion. For grazing lands, the picture depicts deterioration of native plant resources, infestation by weeds, and destruction from soil erosion. Irrigated areas have suffered from their peculiar problems.

Use-capability classification has been selected as one way to cope with the several land use problems. The Department of Agricultural Economics of the Montana State College, in cooperation with federal agencies, has prepared a use-district map for the entire State. This map amounts to presentation of recommended boundaries for future type-of-farming regions. The use-districts are labelled "cash-grain, livestock, general, feed base and/or hay, irrigation, forests, large livestock areas, general farming -- livestock secondary or cash-grain primary -- livestock secondary -- general tertiary."

Owing to differences in available materials, criteria employed in preparing the use-district map are not uniform. The State has maps for all counties to show land use, type of farm, livestock numbers, costs of production, distribution of population, character of ownership, and tax history -- all factors of economic inventory. Extensive map resources on the physical side are the United States Geological Survey classification maps covering most of the State.

Where soil surveys are to be had, more detailed use-capability classification has been undertaken. This work benefits from the use of data on crop yields, range carrying capacity, and distance from market. Resultant maps carry four grades of dry farming land, five of range land, and four of irrigated land. These maps, as well as those for counties with fewer materials, are based in good part on data obtained from AAA wheat allotment records. Allotment applications give the location of three classes of land use for wheat farms: (1) crop land in use; (2) idle crop land; (3) pasture. Yield data are secured from wheat allotment contracts.

The first step in arriving at the boundaries of use-districts is the correlation of maps of use-capabilities, land in farms, and ownership. Tentative areas so derived are revised by reference to other inventory maps. Character of ownership, i.e., resident individual, non-resident individual, corporate, or public, is given particular weight in ascertaining the desirability of boundary locations.

Montana Proposed Use-Districts

- Cash-grain
- Livestock
- General
- Feed base and/ or hay
- Irrigation
- Forests
- Large livestock areas
- General farming - livestock secondary
- Cash-grain primary - livestock secondary - general tertiary

Montana Land Classes - Chouteau County

Farming land - graded as to yield of spring wheat on summer fallow.

- I. 22 bushels per acre or more
- II. 16-21 bushels
- III. 12-15 bushels
- IV. 8-11 bushels

Grazing land - graded as to acres per 1000 lb. steer for 10 months grazing period

- I. 18 acres or less
- II. 19-27 acres
- III. 28-37 acres
- IV. 38-55 acres
- V. 56 acres or more

Region XI

Washington

Land classification in Washington is an ac knowledgment of the manifold problems of the State's cut-over areas. Use-capability appraisal shown by use-districts is under way for eight western counties. This investigation has been spurred by the necessity for directing new settlement to the more satisfactory land types of the cut-over area. In contrast with the situation in many other regions, the recency of forest exploitation signifies that there are few guides to be had in the record of actual use. Gauging use-capability in such cases requires interpretation of the inventory in the light of experience elsewhere. Lacking the benefit of detailed use data, the procedure must bear down heavily on a thorough physical inventory.

Maps of "recommended land use" for the eight counties will cap an exhaustive series of inventory sheets developed by the Washington Agricultural Experiment Station in collaboration with the Washington State Emergency Relief Administration and the Washington State Planning Council. Preliminary use-districts for one county are of three major classes - forest land, agricultural land, "site" land.

Washington Use-Districts
(Preliminary and in process of revision)

Forest land -- commercial forestry recommended

Agricultural land -- land adapted to commercial dairy farming, commercial truck farming, commercial general farming, and part-time farming.

Site lands -- lands recommended for rural residence, part-time farming, commercial poultry farming, commercial fruit farming, farm woodlots, and woodland pasture, and/or recreation.

- 00 -